CHAPTER 6

DECONTAMINATION FACILITIES

6-1. General.

a. Decontamination facilities are required for the safe entry of personnel into a hardened structure from a contaminated area. Decontamination facilities will be provided in communications and control centers, command posts, or other hardened structures in which a mission must be accomplished throughout an enemy attack or where the prolonged operations of such facilities are dependent upon the availability of outside utilities.

b. Decontamination facilities may be omitted or reduced to a minimum size in hardened structures that are primarily shelters in which no specific mission is accomplished and no need exists for the movement of personnel between the outside and inside of the structure during a contaminating event.

c. Decontamination facilities covered in this manual are limited to the corridor type suitable to process those few people who may be required to make outside surveys or repairs. The required decontamination capacity will be determined by the facility system engineering.

d. In structures where uninterrupted operations must be maintained and personnel are placed on a shift basis for "around-the-clock" duty, provisions will be made for the emergency housing and messing of all required personnel within that structure. This eliminates the need for large decontamination facilities and the requirement for additional protected structures for housing and messing. It also simplifies the problem of transporting personnel through the contaminated areas between various buildings.

e. In the exceptional case when a large number of people must be transported through or from contaminated areas to hardened installations, collapsible self-storing decontamination facilities designed by CRDC to process up to 320 persons per hour may be obtained from AMCCOM.

6-2. Entrances.

a. Entrances that do not incorporate decontamination. facilities (covered in TM 5-858-5) are provided with an airtight door behind a pair of blastproof exterior doors resulting in two contiguous chambers; a blast lock and a vestibule.

(1) The blast lock between the blast doors allows opening of one blast door at a time. This permits ingress and egress without loss of interior air pressure, interruption of the blast protection, or direct entry of air into the facility.

(2) Mounted above the exterior blast door is a blast closure and above the inner blast door an antibackdraft valve. These fittings are connected in series by a blast proof ceiling cavity above the blast lock. This allows continuous exhaust of air from the vestibule under a controlled pressure differential independently from the use of the blast lock.

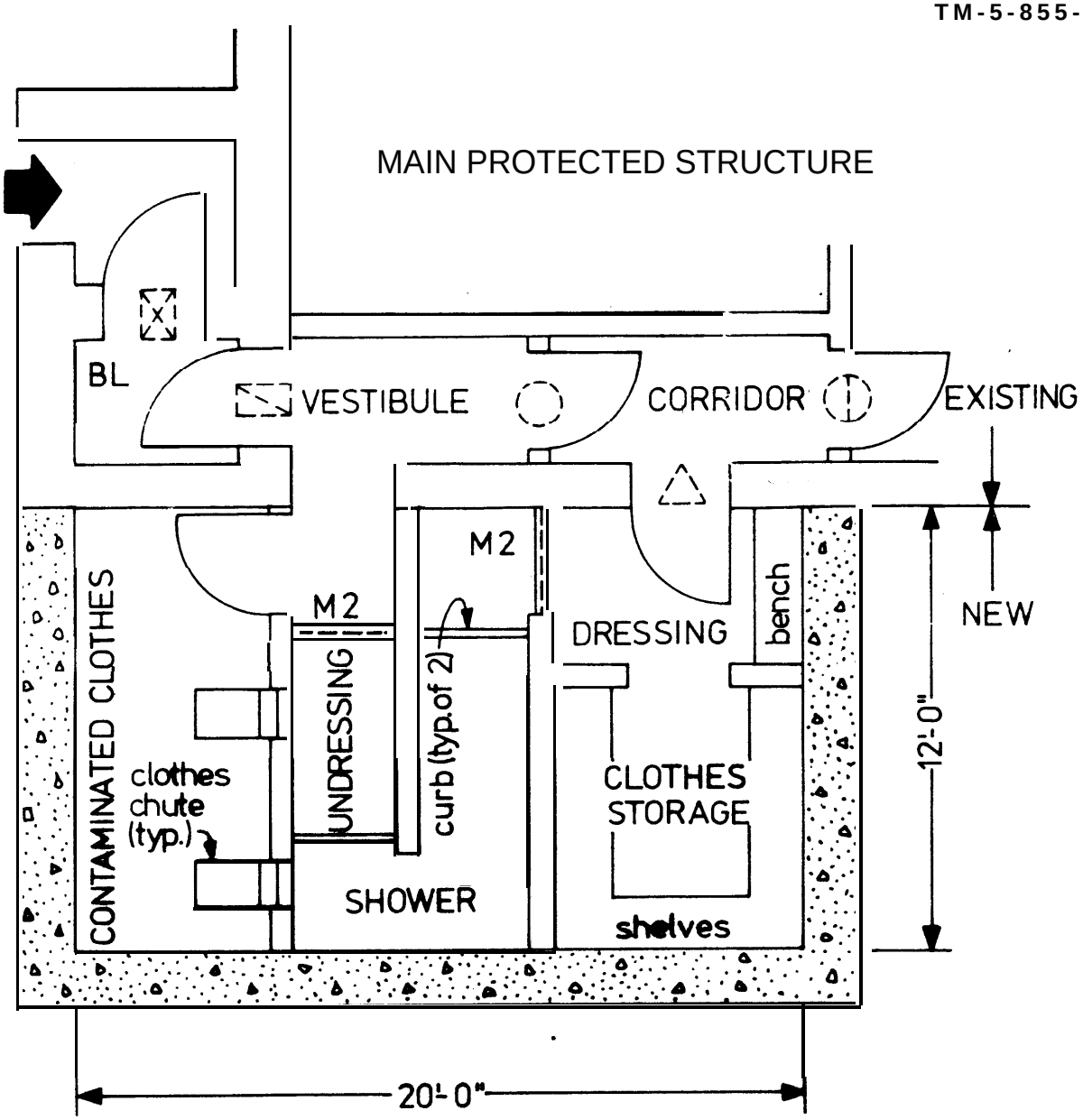
(3) The vestibule between the blast door and the airtight door is a pressurized and ventilated air lock which allows for dilution and exhaust of any outside air introduced in the vestibule by the movement of personnel through the inner blast door.

(4) Mounted above the airtight door separating the vestibule from the rest of the facility is an air pressure regulator to supply no less than 300 cfm of scavenging air to the vestibule under a controlled pressure differential.

b. The addition of decontamination facilities accessible from the vestibule of such entrances, as shown" in figure 6-1, will extend their use to contaminating events. Scavenging air is supplied through the permeable shower doors. As a result the air pressure regulator above the airtight door to the vestibule is eliminated. During contaminating events the vestibule will become contaminated as soon as entries are made, but further contamination of the installation is prevented if the contaminated personnel are diverted through the decontamination facility instead of proceeding through the airtight door used under normal conditions. This will eliminate the everyday use of the decontamination facilities and the requirement of a dedicated entrance.

c. Doors will be provided with locks controlled from inside to prevent inadvertent opening from the contaminated side. Airtight doors that will be used for normal egress and ingress will be Provided with butyl rubber seals fitted in nonferrous metal strips that are readily adjustable and replaceable with the door closed. Doors will swing into the higher pressure area to ensure better sealing. Mechanical closing of pedestrian doors is not recommended. Mechanical operation will be limited to doors of excessive size and weight, and mechanical controls will be located at the door. Remote audible and visual devices indicating the position of doors will be used on all doors if necessary. Blastproof doors are covered in TM 5-858-5.

d. *The* M2 permeable membrane door (NSN 4240-00-891-4276) Shown in figure 6-2 is obtained from AMCCOM for use in decontamination facilities. The membrane consists of two vertical panels or flaps of permeable elastic material stretched on a tubular hoop-frame assembly fitting the door frame. In the center the flaps overlap but because of their elasticity can be momentarily separated by entering personnel without much turbulence and without appreciable loss of interior pressure. At rest the permeable panels will permit an airflow of 400 cfm at a pressure differential 0.1 in. wg as tested by AMCCOM. See figures 6-1, 5-3, and 6-4 for M2 door location at inlet and exit of shower area.



BL = BLAST LOCK WITH BLAST PROOF CEILING PLENUM

M2 = PERMEABLE MEMBRANE DOORS (FIG. 6-2)

= BLAST DOOR WITH BLAST VALVE OVERHEAD

= BLAST DOOR WITH ANTI BACK-DRAFT VALVE OVERHEAD

= AIRTIGHT DOOR (AIR PRESSURE REGULATOR REMOVED)

= AIRTIGHT DOOR WITH AIR PRESSURE REGULATOR OVERHEAD

= LOUVERED DOOR

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Figure 6-1. Corridor type decontamination facility retrofit.

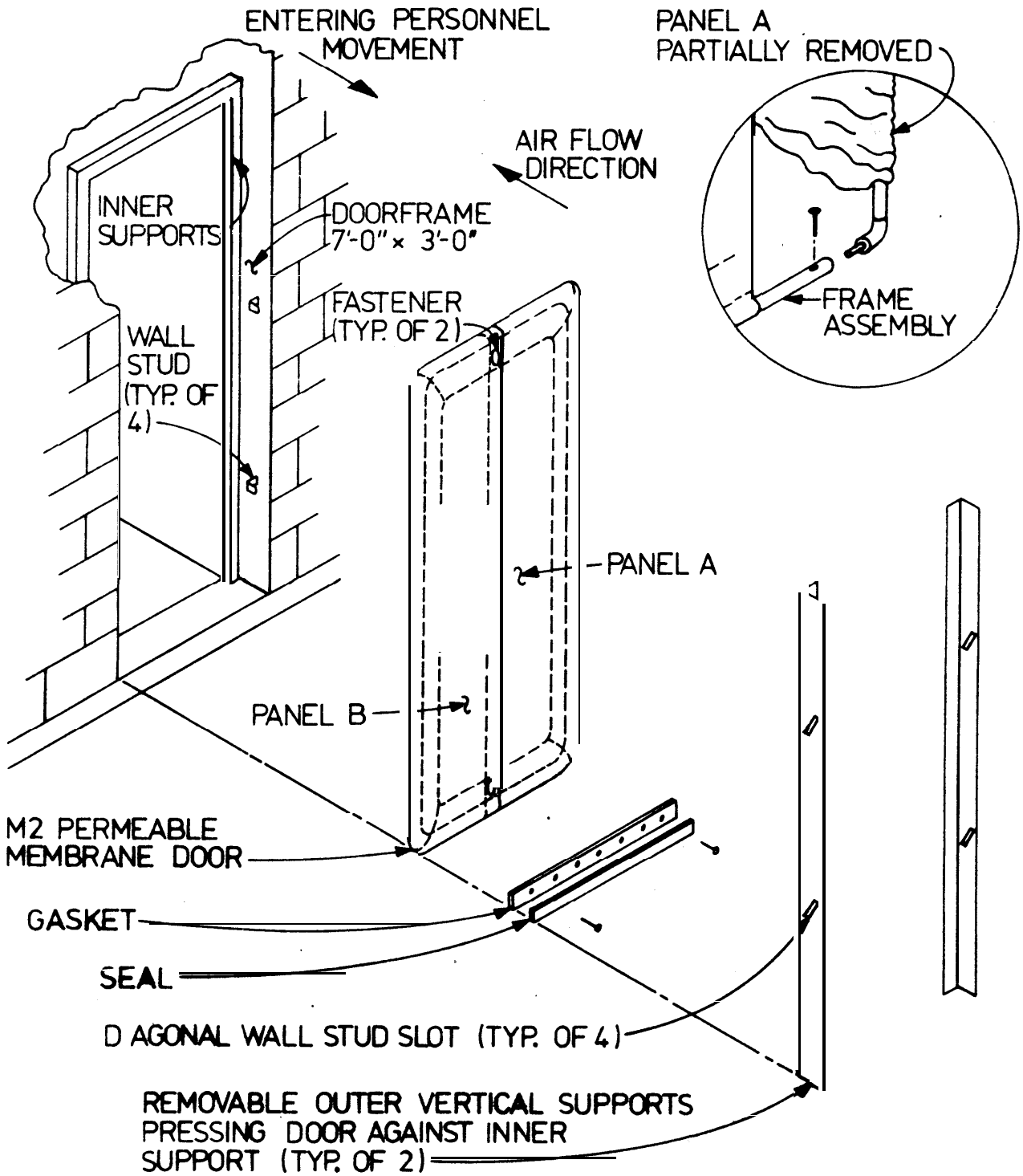

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Figure 6-2. M2 permeable membrane door.

6-3. Decontamination.

a. Procedure. Personnel subjected to contamination must enter a protective structure through a blast lock and a series of chambers having a continuous outward flow of scavenging air including vestibule, space for undressing and disposal of contaminated clothing, facilities for showering, and space for dressing with clean clothing kept in storage.

(1) Upon entering the undressing area persons remove all protective garments and clothing with the exception of the gas mask. All such clothing is disposed of through specially designed chutes into a separate isolated room.

(2) The person then proceeds to the shower area where he removes and disposes of his gas mask after obtaining a thorough rinsing. The mask is disposed of through a second chute located in the shower area. After washing with soap and water, he proceeds to a dressing area where he obtains towel and wearing apparel.

b. Duration. The established time for showering is 3 minutes, which means that a person can obtain safe decontamination of biological contaminants in approximately 9 minutes if an assumption is made that undressing and redressing can each be accomplished in 3 minutes. The time for undressing and redressing will depend upon the amount of clothing worn and issued as well as personal toiletry. It is only the biological contaminants that cannot be immediately detected that necessitate a fixed time and procedure for safe decontamination and entry.

c. System configuration. The physical size of the decontamination facilities and the requirement for duplication will be dependent ‘upon the type of structure, the mission to be accomplished, and the number of persons that may utilize the facilities during any one period.

(1) It may be necessary in certain hardened structures to provide duplicate decontamination facilities to accommodate both male and female occupants, as shown in figure 6-3. However, this should be the exception and not the rule when considering such facilities.

(2) Tests have established the size of the undressing and shower areas as they relate to air quantities for scavenging and personnel activities. Therefore, no change in cross-sectional dimensions of the undressing and shower areas or air quantities will be made without first consulting AMCCOM, Attn: SMCCR-PPP. The standard corridor type decontamination facility is 3 feet wide and 7 feet high with scavenging air at 20 fpm or 400 cfm total air flow.

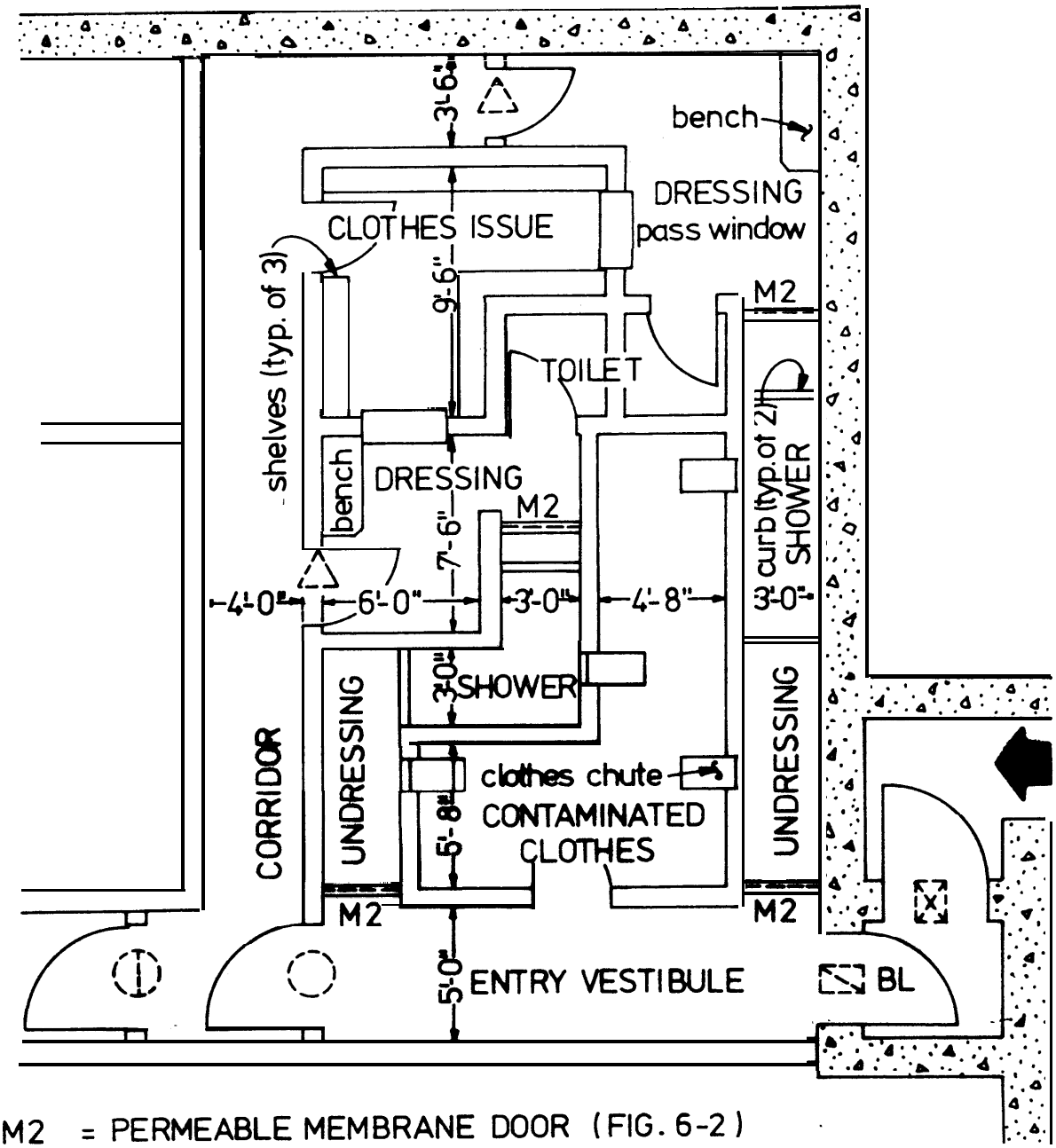
(3) Each person requires 9 square feet for undressing and 9 square feet for showering, thus determining the length of these areas as a function of capacity. For instance, the entry of three persons every 9 minutes will require an undressing area 3 feet wide by 9 feet long (exclusive of door space and shower curbs) and shower area of the same size. When this entry system is operated on a continuous basis, **18** persons per hour can enter the protected area of a structure. Such an entry system is illustrated in figure 6-4.

(4) Each shower position will be provided with one shower head installed directly overhead. Each shower head will have a flow rate of 3 to 5 gallons per minute at design pressure. Water temperatures, need not exceed 95 °F, and total water storage can be figured on the basis of 3-hour operation a day for a period of 12 days.

(5) For dressing rooms air scavenging is not essential, and floor areas of 12 square feet per person will be used as a basis for design. Where possible dressing rooms will be incorporated in the toilet facilities of the structure by providing for the shelf storage of clothing and towels in the toilet area. See figure 6-4.

(6) Shelf space for the storage of towels and clothing will be provided in the dressing area for self-servicing or in a separate room serviced by issuing personnel. Such a separate room may have both male and female apparel and be arranged so that it may service duplicate entry systems as shown in figure 6-3. Shelf space may be determined on the basis of one square foot per person with vertical spacing of 10 inches between shelves.

(7) The contaminated clothing chute designed by AMCCOM is shown in figure 6-5. Clothing is pushed through a vertically hung flap door and placed on a horizontal flap door that prevents exposure of personnel to the outdoors or to previously discarded clothing. The horizontal flap door drops the clothing to the *floor* or into a container after the vertical door closes. The clothes chutes must be placed inside the protected area in a room provided for the collection of contaminated clothing.



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= BLAST DOOR WITH BLAST VALVE OVERHEAD

= BLAST DOOR WITH ANTIBACK-DRAFT VALVE OVERHEAD

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= AIRTIGHT DOOR WITH AIR PRESSURE REGULATOR OVERHEAD

= AIRTIGHT DOOR

= LOUVERED DOOR

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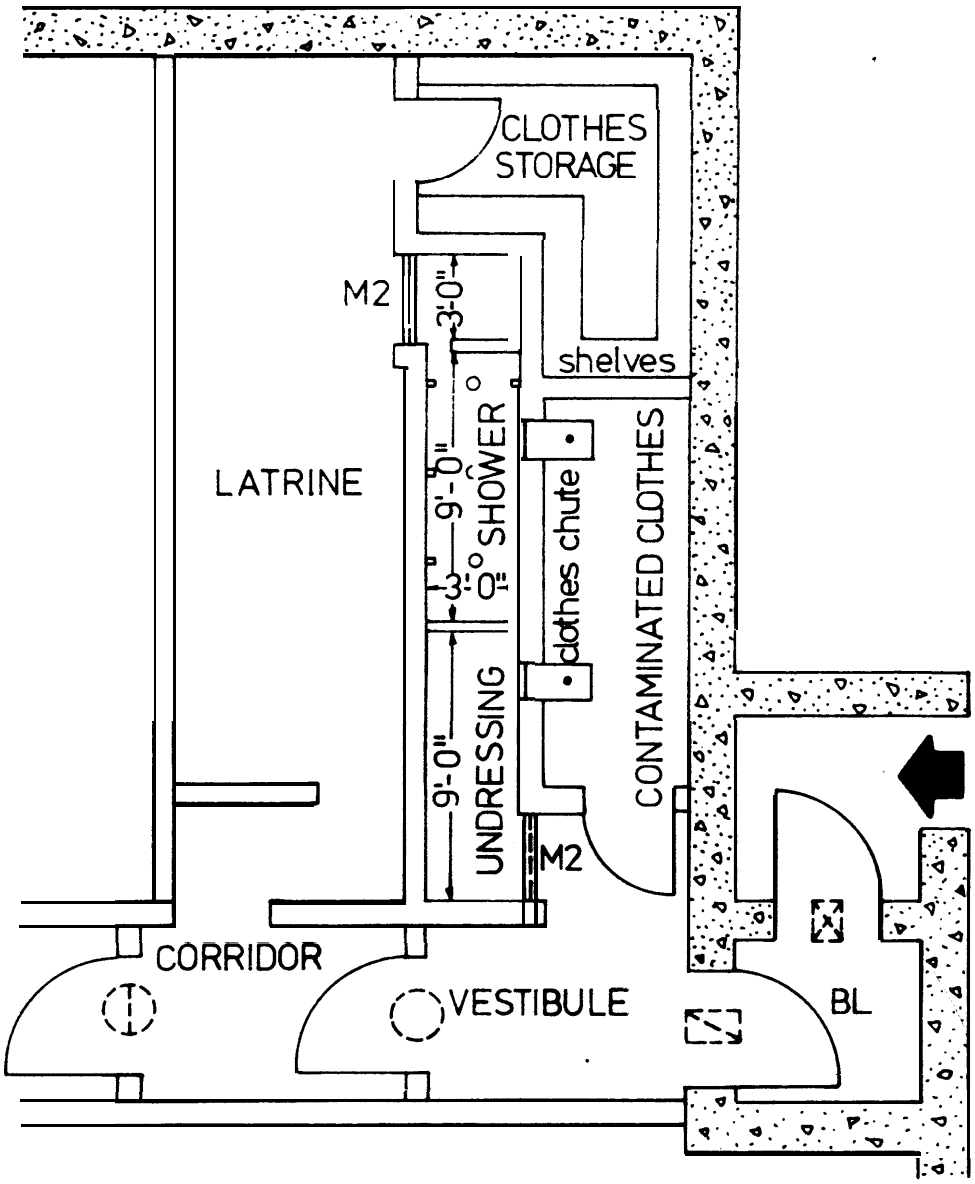
Figure 6-3. Dual decontamination facility.



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AIRTIGHT DOOR WITH AIR PRESSURE REGULATOR OVERHEAD

AIRTIGHT DOOR

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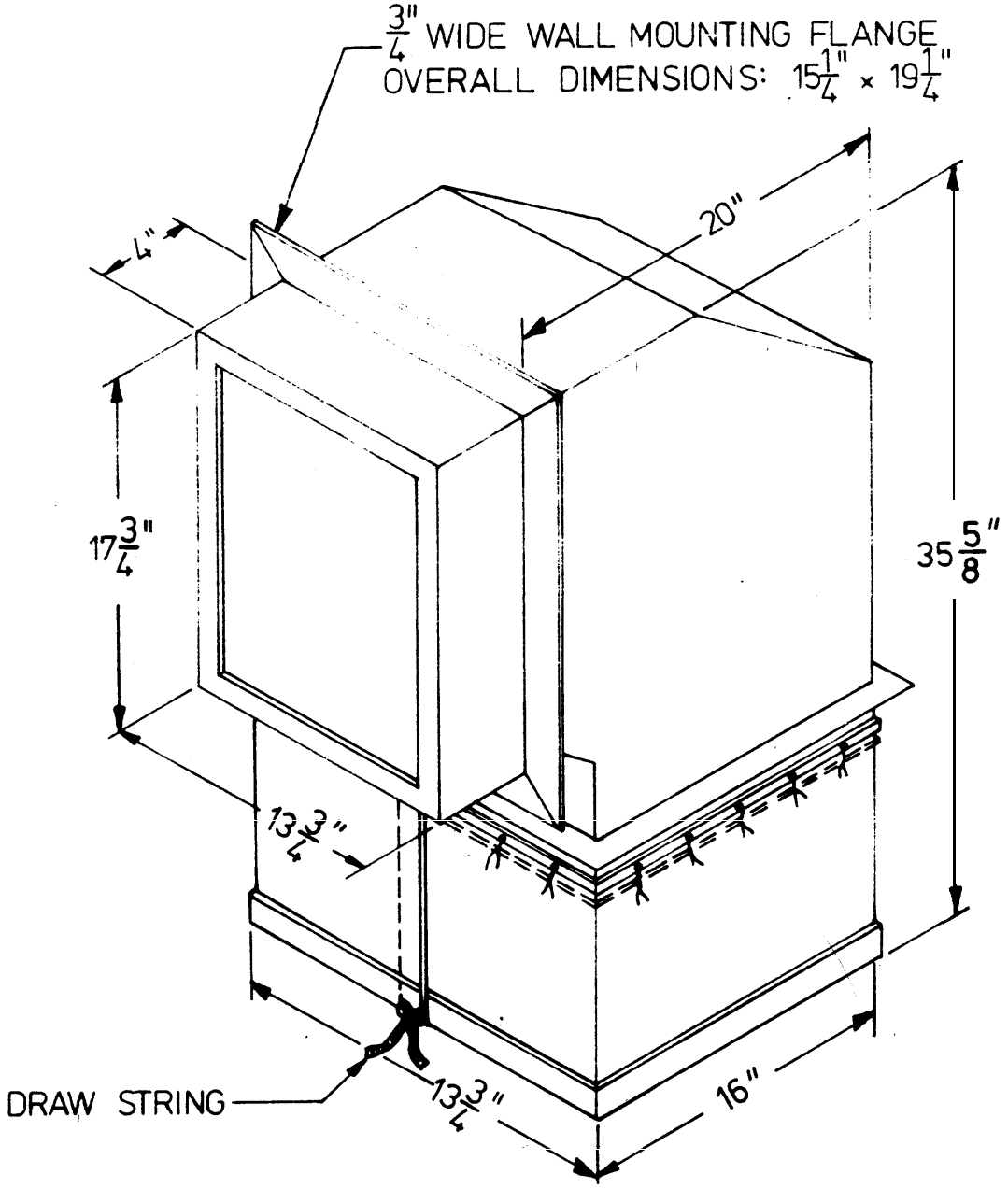
Figure 6-4. Decontamination facility sized for 18 people per hour.



INTERNAL VERTICAL AND HORIZONTAL DOORS NOT SHOWN
USE MASONRY WALL OPENING 18 1/4" x 14 1/4"

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Figure 6-5. Contaminated clothes chute.

6-4. Ventilation.

a. To prevent contaminated air infiltration and to obtain scavenging airflow through the decontamination area, the hardened structure will be pressurized at all times. A vestibule pressure of 0.3 in. wg behind the blast lock will provide adequate protection against infiltration with winds of 25 mph (eq 2-16). The pressure drop through the corridor type decontamination facilities is that of the two M2 doors in series or 0.2 in. wg at 400 cfm scavenging air flow. The total pressure is then 0.5 in. wg in the remainder of the structure.

b. Blast locks and vestibules, discussed in paragraph 6-2, each have a minimum area of the square feet and are provided with blast doors that are not gastight. Depending on the leakage rate of these doors, the blast lock is ventilated at some pressure intermediate between that of the vestibule and the outside. The blast plenum above the blast lock acts as a surge volume to attenuate the overpressure transmitted inwards during the time it takes for the blast valve to seat, thereby reducing the impact of these blow-by effects to tolerable levels. Blast plenum design is covered in TM 5-858-5.

(1) A blast valve will be installed in the air supply duct at the penetration point into the blast lock if additional ventilation air is required.

(2) Moving the antibackdraft valve to the vestibule side and ducting it to an additional blast valve above the inner blast door eliminates the blast plenum and provides a fully ventilated blast lock at ambient zero pressure. However, when the inner blast door is opened the vestibule pressurization is lost and that of the rest of the facility may be compromised by the sudden increase in air loss. As a result this alternate arrangement is not recommended.

c. Air pressure regulator M-1 shown in figure 6-6 is a slide valve designed for installation in a wall between two areas of a hardened structure where airflow and pressure differentials are desired when no permeable door is provided. Such a valve would be installed in the inside wall between the main occupied area of a structure and the vestibule or between any other areas requiring free airflow and pressure differentials.

d. Antiback-draft valve M-2 shown in figure 6-7 will not withstand the forces generated by a strong blast and will be installed upstream from a blast closure. It is used for exhausting air without danger of reversal of airflows in the event that structure pressurization is lost or sudden outside pressure increases as a result of high winds. These valves will be located in the outermost inside wall of a hardened structure as shown on figures 6-1 through 6-4. Similar wall or ceiling mounted, counterbalanced or spring type adjustable, heavy duty backdraft dampers, serviceable from either side, are commercially available.

e. To ensure that the required pressures are obtained and maintained, a manometer with necessary outlets to the outside, the vestibule, the decontamination area, and the main structure will be installed at a convenient control point.

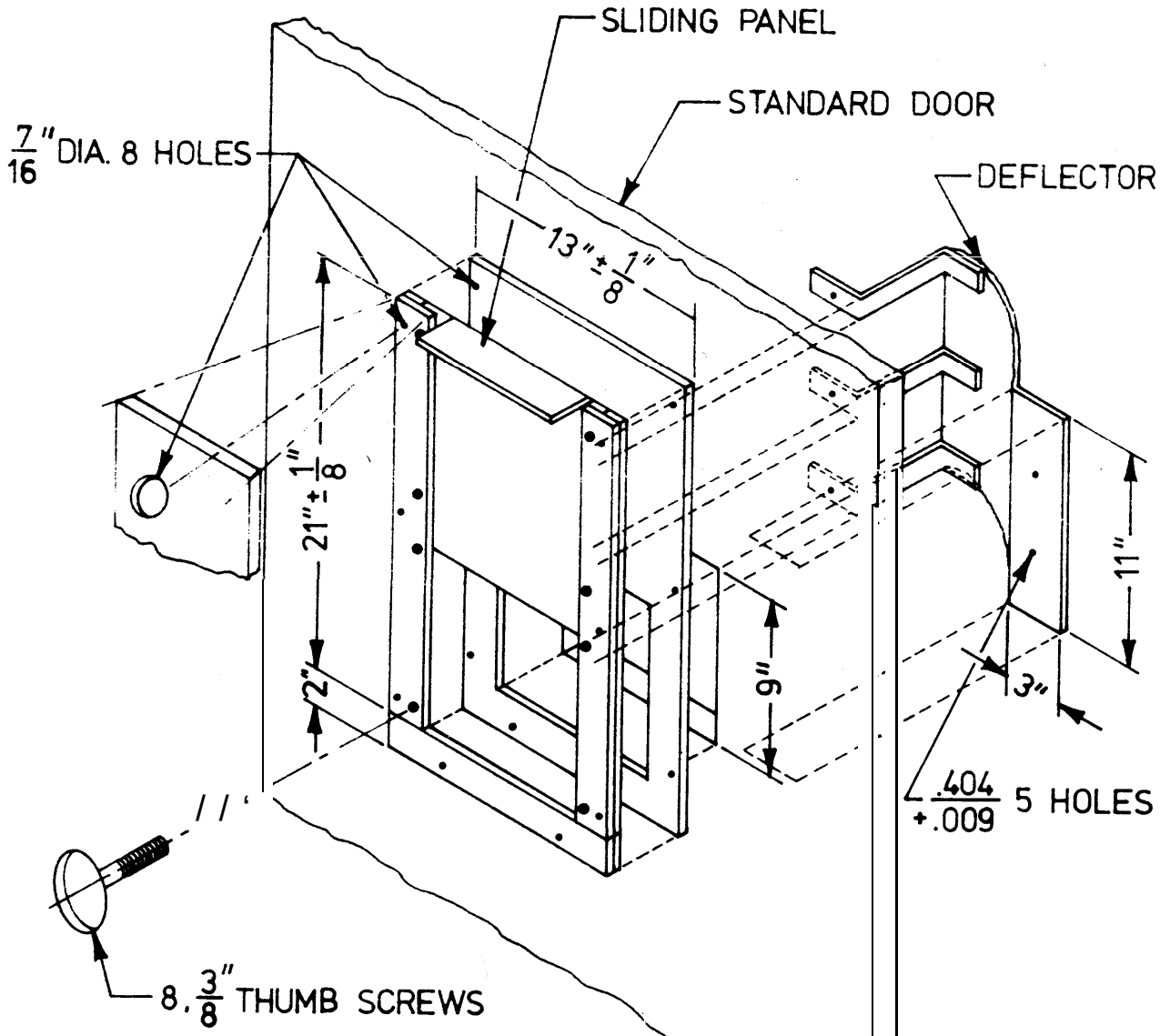

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Figure 6-6. Air pressure regulator M-1.

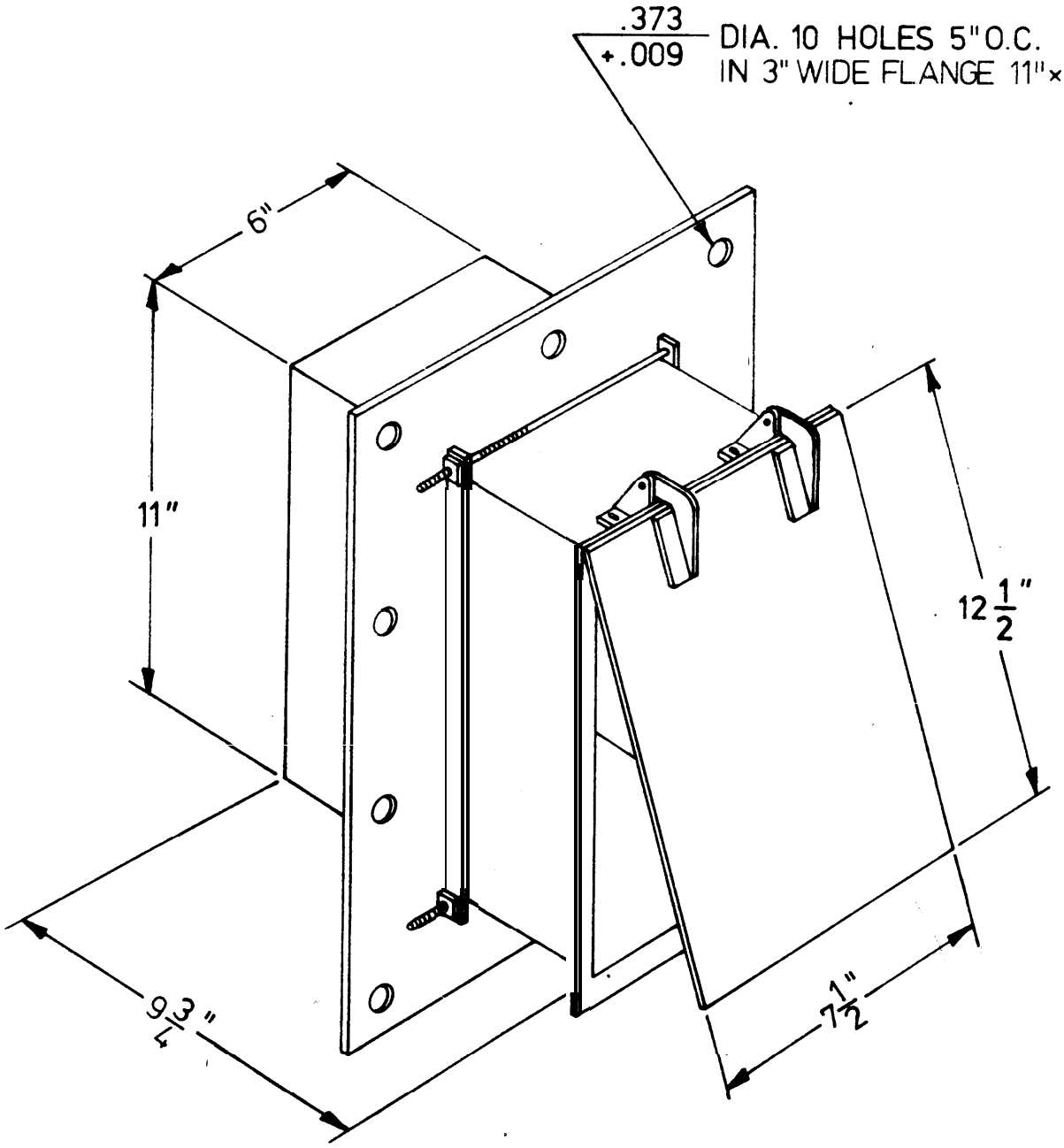

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Figure 6-7. Antiback-draft valve.